Access DB# 122253

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Raymond Alejandro Examiner #: 76895 Date: 05/17/04
Art Unit: 1745 Phone Number 305 571 272-1282 Serial Number: 09/827,904
Mail Box and Bldg/Room Location: Rem 6B59 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

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Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Injection Molded Fuel Cell Endplate

Inventors (please provide full names): Agizy et al.

Earliest Priority Filing Date: 04/06/01

***For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.**

Please search for subject matter of claims 1-4 & 6-20.

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STAFF USE ONLY	Type of Search		Vendors and cost where applicable	
Searcher: ES	NA Sequence (#)		STN	$131.26
Searcher Phone #:	AA Sequence (#)		Dialog	
Searcher Location:	Structure (#)		Questel/Orbit	
Date Searcher Picked Up:	Bibliographic	✓	Dr.Link	
Date Completed: 5-20-04	Litigation		Lexis/Nexis	
Searcher Prep & Review Time: 5	Fulltext		Sequence Systems	
~~Clerical Prep Time:~~	Patent Family		WWW/Internet	
Online Time: 80	Other		Other (specify)	

PTO-1590 (8-01)

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FILE 'REGISTRY' ENTERED AT 10:04:47 ON 20 MAY 2004
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=> display history full l1-


     FILE 'LCA' ENTERED AT 09:26:53 ON 20 MAY 2004
L1          208 SEA THERMOPLASTIC?
L2           21 SEA (AROM# OR AROMATIC?)(2A)(POLYAMIDE# OR POLY(A)AMIDE#)
                 OR POLYARYLSULFONE# OR POLYARYL#(A)(SULFONE# OR
                SULPHONE#) OR POLY(2A)(ARYLSULFONE# OR ARYLSULPHONE# OR
                ARYL#(A)(SULFONE# OR SULPHONE#)) OR POLYARYLETHERKETONE#
                OR POLYARYL#(2A)(ETHERKETONE# OR KETONEETHER# OR
                ETHER#(A)KETONE#)
L3            0 SEA POLY(2A)(ARYLETHERKETONE# OR ARYLKETONEETHER# OR
                ARYL#(2A)(ETHERKETONE# OR KETONEETHER# OR ETHER#(A)KETONE
                #)) OR POLYARYLETHERIMIDE# OR POLYARYLIMID!ETHER# OR
                POLYARYL#(2A)(ETHERIMIDE# OR IMID!ETHER# OR ETHER#(A)IMID
                ##) OR POLY(2A)(ARYLETHERIMIDE# OR ARYLIMID!ETHER#)
L4            3 SEA POLY(2A)(ARYL#(2A)(ETHERIMIDE# OR ETHER#(A)IMID##))
                OR POLYARYLIMIDE# OR POLYARYL#(A)IMIDE# OR POLY(2A)(ARYLI
                MIDE# OR ARYL#(A)IMIDE#) OR THERMOTROP?(2A)(LC OR L(W)C
                OR (LIQ# OR LIQUID#)(2A)CRYST?)

     FILE 'REGISTRY' ENTERED AT 09:43:26 ON 20 MAY 2004
                E POLYPHENYLENE SULFIDE/CN
                E POLYPHENYLENESULFIDE/CN
                E PHENYLENE SULFIDE POLYMER/CN
                E PHENYLENE SULFIDE HOMOPOLYMER/CN
                E PHENYLENESULFIDE HOMOPOLYMER/CN

     FILE 'LCA' ENTERED AT 09:44:22 ON 20 MAY 2004
L5            3 SEA POLYPHENYLENE#(2A)SULFIDE#

     FILE 'HCA' ENTERED AT 09:46:41 ON 20 MAY 2004
L6         3244 SEA POLYPHENYLENE#(2A)SULFIDE#

     FILE 'REGISTRY' ENTERED AT 09:47:51 ON 20 MAY 2004
L7            1 SEA 25212-74-2

     FILE 'LCA' ENTERED AT 09:50:01 ON 20 MAY 2004
L8           11 SEA L7 OR POLYARYLENESULFIDE# OR POLYARYLENESULPHIDE# OR
                POLYARYLENE#(A)(SULFIDE# OR SULPHIDE#) OR POLY(2A)(ARYLEN
                ESULFIDE# OR ARYLENESULPHIDE# OR ARYLENE#(A)(SULFIDE# OR
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SULPHIDE#)) OR POLYPHENYLENESULFIDE# OR POLYPHENYLENESULP
HIDE# OR POLYPHENYLENE#(2A)(SULFIDE# OR SULPHIDE#)
L9 3 SEA POLY(2A)(PHENYLENESULFIDE# OR PHENYLENESULPHIDE# OR
PHENYLENE#(A)(SULFIDE# OR SULPHIDE#))

FILE 'HCA, WPIX, JAPIO' ENTERED AT 09:55:58 ON 20 MAY 2004
L10 41352 SEA FUELCELL? OR FUEL?(2A)(CELL OR CELLS)
L11 23270 SEA FUELCELL? OR FUEL?(2A)(CELL OR CELLS)
L12 15289 SEA FUELCELL? OR FUEL?(2A)(CELL OR CELLS)
TOTAL FOR ALL FILES
L13 79911 SEA FUELCELL? OR FUEL?(2A)(CELL OR CELLS)
L14 6664 SEA ENDPLATE# OR (END OR ENDS OR ENDED OR ENDING# OR
COMPRESSION?)(2A)(PLATE OR PLATES) OR COMPRESSIONPLATE#
L15 48705 SEA ENDPLATE# OR (END OR ENDS OR ENDED OR ENDING# OR
COMPRESSION?)(2A)(PLATE OR PLATES) OR COMPRESSIONPLATE#
L16 17544 SEA ENDPLATE# OR (END OR ENDS OR ENDED OR ENDING# OR
COMPRESSION?)(2A)(PLATE OR PLATES) OR COMPRESSIONPLATE#
TOTAL FOR ALL FILES
L17 72913 SEA ENDPLATE# OR (END OR ENDS OR ENDED OR ENDING# OR
COMPRESSION?)(2A)(PLATE OR PLATES) OR COMPRESSIONPLATE#
L18 97792 SEA THERMOPLASTIC? OR THERMO(A)PLASTIC?
L19 157496 SEA THERMOPLASTIC? OR THERMO(A)PLASTIC?
L20 66590 SEA THERMOPLASTIC? OR THERMO(A)PLASTIC?
TOTAL FOR ALL FILES
L21 321878 SEA THERMOPLASTIC? OR THERMO(A) PLASTIC?
L22 15816 SEA L2 OR L3 OR L4
L23 9641 SEA L2 OR L3 OR L4
L24 4550 SEA L2 OR L3 OR L4
TOTAL FOR ALL FILES
L25 30007 SEA L2 OR L3 OR L4
L26 7332 SEA L8 OR L9
L27 7732 SEA L8 OR L9
L28 3968 SEA L8 OR L9
TOTAL FOR ALL FILES
L29 19032 SEA L8 OR L9
L30 199 SEA L10 AND L14
L31 303 SEA L11 AND L15
L32 224 SEA L12 AND L16
TOTAL FOR ALL FILES
L33 726 SEA L13 AND L17
L34 8 SEA L30 AND L18
L35 11 SEA L31 AND L19
L36 2 SEA L32 AND L20
TOTAL FOR ALL FILES
L37 21 SEA L33 AND L21
L38 1 SEA L30 AND L22
L39 1 SEA L31 AND L23
L40 0 SEA L32 AND L24

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     TOTAL FOR ALL FILES
L41            2 SEA L33 AND L25
L42            1 SEA L30 AND L26
L43            3 SEA L31 AND L27
L44            1 SEA L32 AND L28
     TOTAL FOR ALL FILES
L45            5 SEA L33 AND L29

     FILE 'HCA' ENTERED AT 10:03:12 ON 20 MAY 2004
L46            9 SEA L34 OR L38 OR L42

     FILE 'WPIX' ENTERED AT 10:03:33 ON 20 MAY 2004
L47           13 SEA L35 OR L39 OR L43

     FILE 'JAPIO' ENTERED AT 10:04:02 ON 20 MAY 2004
L48            3 SEA L36 OR L44


=> file japio
FILE 'JAPIO' ENTERED AT 10:05:02 ON 20 MAY 2004
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FILE LAST UPDATED: 14 MAY 2004       <20040514/UP>
FILE COVERS APR 1973 TO JANUARY 29, 2004


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L48  ANSWER 1 OF 3  JAPIO  (C) 2004 JPO  on STN
ACCESSION NUMBER:         2004-031330    JAPIO
TITLE:                    CONTACT PLATE FOR ELECTROCHEMICAL CELL
INVENTOR:                 GANSKI ALBIN VON; HAGENBACH THOMAS; MUELLER
                          ALWIN
PATENT ASSIGNEE(S):       SGL CARBON AG
PATENT INFORMATION:

     PATENT NO        KIND   DATE         ERA     MAIN IPC
     ------------------------------------------------------
     JP 2004031330    A      20040129     Heisei  H01M008-02

APPLICATION INFORMATION
     STN FORMAT:          JP 2003-109022         20030414
     ORIGINAL:            JP2003109022           Heisei
PRIORITY APPLN. INFO.:    DE 2002-10216306    20020414
SOURCE:                   PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined
                          Applications, Vol. 2004
AN   2004-031330    JAPIO
AB   PROBLEM TO BE SOLVED: To provide a method for manufacturing a
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contact plate for a **fuel cell** having an **end plate**, a double-pole plate and a cooling material distribution structure from a composite material made of a cheap **thermoplastic** resin.
SOLUTION: A contact plate for an electrochemical cell (7), made of the composite material of a graphite/**thermoplastic** resin having a graphite percentage of at least 80 % in mass, containing a functional element (16) necessary to carry reaction media (17, 24), and making an electrical contact with electrodes (2, 3) is designed in fluid engineering so as to be manufactured in an injection molding process without secondary processing. The making of an edge area and a seal of a non-conductive material for surrounding the contact plate is integrated into a multi-component injection molding process so that the whole of the contact plate including the edge area and the seal can be manufactured with a single mold for injection molding.

IC ICM H01M008-02

L48 ANSWER 2 OF 3 JAPIO (C) 2004 JPO on STN
ACCESSION NUMBER: 1998-270066 JAPIO
TITLE: **FUEL CELL**
INVENTOR: YOSHIMOTO YASUNORI; NAKATO KUNIHIRO
PATENT ASSIGNEE(S): SANYO ELECTRIC CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 10270066	A	19981009	Heisei	H01M008-24

APPLICATION INFORMATION
STN FORMAT: JP 1997-73889 19970326
ORIGINAL: JP09073889 Heisei
PRIORITY APPLN. INFO.: JP 1997-73889 19970326
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1998
AN 1998-270066 JAPIO
AB PROBLEM TO BE SOLVED: To provide an **end plate** with electric improved insulation.
SOLUTION: For **end plates** 3, 4 used for a **fuel cell**, metal plates 31, 41 formed of aluminum with a preset thickness and sufficient strength are coated with insulating film sheet structures 32, 42 formed of fluorine based resin including polytertrafluoroethylene(PTEE) and **polyphenylenesulfide**(PPS). Coating with the insulating films is applied at least to an area opposed to a cell stack of the plate and to an area opposed to a manifold and so no pin hole is formed in the insulating layers of the **end plates** 3, 4,

resúlating in excellent electric insulation.
COPYRIGHT: (C)1998,JPO
IC ICM H01M008-24

L48 ANSWER 3 OF 3 JAPIO (C) 2004 JPO on STN
ACCESSION NUMBER: 1988-211570 JAPIO
TITLE: STACK SEALING METHOD
INVENTOR: NOMURA YOICHI; KONUKI TOSHIAKI
PATENT ASSIGNEE(S): SHIN KOBE ELECTRIC MACH CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 63211570	A	19880902	Showa	H01M008-02

APPLICATION INFORMATION
STN FORMAT: JP 1987-42334 19870225
ORIGINAL: JP62042334 Showa
PRIORITY APPLN. INFO.: JP 1987-42334 19870225
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1988
AN 1988-211570 JAPIO
AB PURPOSE: To simply, surely seal a liquid **fuel cell** comprising many stacks by using a **thermoplastic** resin closed-cell porous body which is converted into elastic body by heating.
CONSTITUTION: A liquid **fuel cell** is fabricated by sequentially stacking fuel electrodes 12, 12'..., air electrodes 13, 13'..., electrolytes 14, 14'..., bipolar **plates** 15, 15', **end plates** 16, 16', and **end plates** 17, 17'. Seal required portions for cell operation such as the place between the plate 15 and the plate 16 have almost the equal dimensions in each layer. **Thermoplastic** resin elastic bodies 9<SB>1</SB>, 9<SB>2</SB>... are arranged in sealing portions so that each **thermoplastic** resin body expands in a required volume by heating to seal each sealing portion. Even if the accuracy of parts is low, sealing portions of many layers are simply, surely sealed by heating.
COPYRIGHT: (C)1988,JPO&Japio
IC ICM H01M008-02
ICS H01M008-24

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=> d l46 1-9 cbib abs hitstr hitind

L46 ANSWER 1 OF 9 HCA COPYRIGHT 2004 ACS on STN
139:352719 Membrane based electrochemical cell stacks. Osenar, Paul; Sabin, Paul; Enayetullah, Mohammad; Formato, Richard M. (Protonex Technology Corporation, USA). PCT Int. Appl. WO 2003092096 A2 20031106, 47 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2003-US12684 20030423. PRIORITY: US 2002-PV374631 20020423.

AB The present invention provides membrane cassettes and stacks thereof which are suitable for a use in a variety of electrochem. applications. The invention further provides membrane cassettes which comprise one or more bipolar plates which have one or two reactant or coolant flow fields consisting of at least one groove in opposing surfaces of the bipolar plate. In certain preferred embodiments, the invention provides cassettes and stacks which are suitable for use in **fuel cell** applications.

IC ICM H01M

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72

ST membrane based electrochem cell stack; **fuel cell** stack membrane based

IT Alloys, uses
Metals, uses
(**end plate**; membrane based electrochem. cell stacks)

IT **Thermoplastic** rubber
(olefins; membrane based electrochem. cell stacks)

IT Solid state **fuel cells**
(proton exchange membrane; membrane based electrochem. cell stacks)

IT Polyurethanes, uses
(**thermoplastic**; membrane based electrochem. cell stacks)

IT Plastics, uses
(**thermoplastics**; membrane based electrochem. cell stacks)

IT 7429-90-5, Aluminum, uses
(**end plate**; membrane based electrochem. cell

stacks)

L46 ANSWER 2 OF 9 HCA COPYRIGHT 2004 ACS on STN
138:341109 One-shot fabrication of membrane-based electrochemical cell stacks. Osenar, Paul; Sabin, Paul; Enayetullah, Mohammad; Formato, Richard M. (Protonex Technology Corporation, USA). PCT Int. Appl. WO 2003036747 A1 20030501, 49 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2002-US33789 20021022. PRIORITY: US 2001-PV337851 20011022.

AB The present invention provides membrane cassettes and stacks thereof which are suitable for a use in a variety of electrochem. and ion exchange applications. The present invention also provides methods of manufg. the membrane cassettes and stacks of the invention. In certain preferred embodiments, the invention provides cassettes and stacks which are suitable for use in **fuel cell** applications.

IC ICM H01M008-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72

ST **fuel cell** membrane based stack; electrochem cell membrane based stack

IT Alloys, uses
(**end plate**; one-shot fabrication of membrane-based electrochem. cell stacks)

IT Electrochemical cells
Encapsulation
Ion exchange
Laser cutting
Sealing
Sealing compositions
Solid state **fuel cells**
(one-shot fabrication of membrane-based electrochem. cell stacks)

IT Glass fibers, uses
(**thermoplastic** reinforced with; one-shot fabrication of membrane-based electrochem. cell stacks)

IT Plastics, uses
(**thermoplastics**; one-shot fabrication of membrane-based electrochem. cell stacks)

IT 7782-42-5, Graphite, uses
(**thermoplastic** reinforced with; one-shot fabrication of

membrane-based electrochem. cell stacks)

L46 ANSWER 3 OF 9 HCA COPYRIGHT 2004 ACS on STN
138:125005 Metal-cored bipolar separator and **end plates** for polymer electrolyte membrane electrochemical and **fuel cells**. Davis, Herbert John (Avantcell Technologies Inc., Can.). PCT Int. Appl. WO 2003009408 A1 20030130, 25 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2002-CA1110 20020717. PRIORITY: US 2001-906715 20010718.

AB Methods of treating the surface of metals, such as aluminum, so that they can withstand the corrosive conditions in polymer electrolyte membrane, including those types known as proton exchange membrane, **fuel cells** and similar electrochem. environments and still maintain a high level of elec. and thermal cond. over extended periods of time, are disclosed. A conductive polymer outer layer used in combination with an intermediate layer between the conductive polymer and a core metal, that comprises a thin layer of silver, or other noble metal, at the interface between the conductive polymer and an underlying metal layer, are compatible with the requirements of PEM **fuel cells**. Such treated metals can be formed into bipolar **plates** or **end plates** after receiving the coatings, or the conductive polymer layer can be applied or shaped into specifically required forms, alternatively the core metal can be previously formed into the required phys. form and then treated on its surfaces so as to realize the benefits of this invention.

IC ICM H01M008-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72

ST **fuel cell** metal cored bipolar separator; battery metal cored bipolar separator; electrochem cell metal cored bipolar separator

IT Electric apparatus
(electrochem.; metal-cored bipolar separator and **end plates** for polymer electrolyte membrane electrochem. and **fuel cells**)

IT Conducting polymers
Fuel cell separators
Polymer electrolytes
Primary battery separators

Solid state **fuel cells**
(metal-cored bipolar separator and **end plates** for polymer electrolyte membrane electrochem. and **fuel cells**)

IT Alloys, uses
Noble metals
(metal-cored bipolar separator and **end plates** for polymer electrolyte membrane electrochem. and **fuel cells**)

IT Plastics, uses
(**thermoplastics**; metal-cored bipolar separator and **end plates** for polymer electrolyte membrane electrochem. and **fuel cells**)

IT Plastics, uses
(thermosetting; metal-cored bipolar separator and **end plates** for polymer electrolyte membrane electrochem. and **fuel cells**)

IT 7440-31-5, Tin, uses 7440-66-6, Zinc, uses
(coating; metal-cored bipolar separator and **end plates** for polymer electrolyte membrane electrochem. and **fuel cells**)

IT 7429-90-5, Aluminum, uses 7439-92-1, Lead, uses 7439-95-4, Magnesium, uses 7440-02-0, Nickel, uses 7440-22-4, Silver, uses 7440-32-6, Titanium, uses 7440-50-8, Copper, uses 7440-69-9, Bismuth, uses 7440-74-6, Indium, uses 9003-35-4 11110-87-5 11146-15-9 12597-69-2, Steel, uses
(metal-cored bipolar separator and **end plates** for polymer electrolyte membrane electrochem. and **fuel cells**)

L46 ANSWER 4 OF 9 HCA COPYRIGHT 2004 ACS on STN
137:387169 Fabrication of injection molded **fuel cell endplate** from a **thermoplastic** resin composite.
Agizy, Ami Ei; Sheridan, David M.; Hanson, Richard G. (USA). U.S. Pat. Appl. Publ. US 2002182470 A1 20021205, 7 pp. (English).
CODEN: USXXCO. APPLICATION: US 2001-827904 20010406.

AB Molded **fuel cell endplate** fabricated from a long fiber reinforced **thermoplastic** resin composite comprises: (a) a **thermoplastic** resin; and (b) at least about 30 wt.% of long strand glass fiber having a fiber length of at least about 5 mm.

IC ICM H01M008-02
NCL 429034000; 429037000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **fuel cell endplate** injection molded; **thermoplastic** resin composite **fuel cell endplate**

IT **Liquid crystals**, polymeric
(arom., **thermotropic**; fabrication of injection molded **fuel cell endplate** from **thermoplastic** resin composite)
IT **Polyamides**, uses
Polyimides, uses
Polysulfones, uses
(**arom.**; fabrication of injection molded **fuel cell endplate** from **thermoplastic** resin composite)
IT **Fuel cells**
(fabrication of injection molded **fuel cell endplate** from **thermoplastic** resin composite)
IT Glass fibers, uses
Polythioarylenes
Polythiophenylenes
(fabrication of injection molded **fuel cell endplate** from **thermoplastic** resin composite)
IT Creep
(flexural; fabrication of injection molded **fuel cell endplate** from **thermoplastic** resin composite)
IT Molding
(injection; fabrication of injection molded **fuel cell endplate** from **thermoplastic** resin composite)
IT Polyimides, uses
Polyketones
Polyketones
(polyether-, arom.; fabrication of injection molded **fuel cell endplate** from **thermoplastic** resin composite)
IT Polyethers, uses
(polyimide-, arom.; fabrication of injection molded **fuel cell endplate** from **thermoplastic** resin composite)
IT Polyethers, uses
Polyethers, uses
(polyketone-, arom.; fabrication of injection molded **fuel cell endplate** from **thermoplastic** resin composite)
IT Plastics, uses
(**thermoplastics**; fabrication of injection molded **fuel cell endplate** from **thermoplastic** resin composite)

L46 ANSWER 5 OF 9 HCA COPYRIGHT 2004 ACS on STN
137:248431 Conductive molding plastic composition for the manufacture of

fuel cell plates. Hofmann, Achim; Fritz, Hans-Gerhard; Kaiser, Ralf (Ticona G.m.b.H., Germany). PCT Int. Appl. WO 2002072669 A1 20020919, 46 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CN, CO, CR, CU, CZ, DM, DZ, EC, EE, GD, GE, HR, HU, ID, IL, IN, IS, JP, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LV, MA, MD, MG, MK, MN, MX, NO, NZ, OM, PH, PL, RO, RU, SG, SI, SK, TJ, TM, TN, TT, UA, US, UZ, VN, YU, ZA, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (German). CODEN: PIXXD2. APPLICATION: WO 2002-EP936 20020130. PRIORITY: DE 2001-10112394 20010313.

AB A title compn. with increased cond. and improved flowability and mech. properties, useful for the manuf. of **fuel cell** bipolar **plates** and **end plates**, comprises **poly(arylene sulfide)** and/or liq. cryst. polymer, e.g., polyester, as matrix materials, carbon black having surface area 500-1500 m2/g and di-Bu phthalate no. 100-700 mL/100 g, graphite powder with surface area 1-35 m2/g, and/or metal (specifically Zn) powder.

IC ICM C08G075-02
ICS C08G063-06; C08L079-08; H01M008-02; H01B001-20; H01B001-22; H01B001-24; C08L081-02; C08G063-19; C08G063-183; C08K003-04; C08K003-08

CC 37-6 (Plastics Manufacture and Processing)
Section cross-reference(s): 38, 52, 76

ST polythiophenylene blend liq cryst polyester carbon black elec cond; graphite carbon black zinc powder polythiophenylene blend **fuel cell; fuel cell end plate** polythiophenylene conductive blend

IT Carbon black, uses
(Ketjenblack EC-DJ 600; conductive molding plastic compn. for manuf. of **fuel cell** plates)

IT **Fuel cells**
(bipolar **plates** and **end plates**; conductive molding plastic compn. for manuf. of)

IT Polymer blends
Polythiophenylenes
(conductive molding plastic compn. for manuf. of **fuel cell** plates)

IT Polyesters, uses
(liq.-cryst.; conductive molding plastic compn. for manuf. of **fuel cell** plates)

IT Liquid crystals, polymeric
(polyesters; conductive molding plastic compn. for manuf. of **fuel cell** plates)

IT 81843-52-9, Vectra A 950
(conductive molding plastic compn. for manuf. of **fuel cell** plates)

IT 7440-66-6, Zinc, uses 7782-42-5, Thermocarb CF 300, uses
(powder; conductive molding plastic compn. for manuf. of **fuel cell** plates)

L46 ANSWER 6 OF 9 HCA COPYRIGHT 2004 ACS on STN
136:297396 Method for production of a bipolar plate for **fuel cells**. Koschany, Arthur (Manhattan Scientifics, Inc., USA). Eur. Pat. Appl. EP 1195829 A2 20020410, 13 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (German). CODEN: EPXXDW. APPLICATION: EP 2000-121679 20001004.

AB A simple process is disclosed for the prodn. of a bipolar **plate** or an **end plate** of a **fuel cell** stack from a gas nontransparent, elec. conductive, smooth layer and porous protrusion bonded to it in mech. stable and elec. conducting manner. The plate comprises a gas nontransparent elec. conductive layer serving as a separator and a channel structure formed on ≥1 side of the layer and protrusions and the gaps (serving as gas channels) lying in between the protrusions. The gas nontransparent layer is placed ready, and the protrusion is brought with release of the gaps in definite location on the layer. In an aspect of the invention, a channel structure leaf is fabricated as channel structure, which encloses the protrusion arranged in given layout and bonded with each other by bridges; the channel structure leaf is placed on the gas nontransparent side, to bind it with this layer by placing the channel structure on the layer by pressing, and the bridges are removed before or after the bonding.

IC ICM H01M008-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **fuel cell** bipolar plate
IT Carbon fibers, uses
(fleece; method for prodn. of bipolar plate for **fuel cells**)
IT Carbon fibers, uses
(graphite; method for prodn. of bipolar plate for **fuel cells**)
IT **Fuel cell** electrodes
Fuel cells
Soot
(method for prodn. of bipolar plate for **fuel cells**)
IT Epoxy resins, uses
Fluoropolymers, uses
(method for prodn. of bipolar plate for **fuel cells**)
IT Plastics, uses
(**thermoplastics**; method for prodn. of bipolar plate for

fuel cells)
IT 7782-42-5, Graphite, uses
(method for prodn. of bipolar plate for **fuel cells**)
IT 9002-84-0, Ptfe 9002-88-4, Polyethylene 9003-07-0, Polypropylene
(method for prodn. of bipolar plate for **fuel cells**)

L46 ANSWER 7 OF 9 HCA COPYRIGHT 2004 ACS on STN
136:153938 **Fuel cell** with electrical conductive bipolar plates produced by injection molding of plastics. Hoeller, Stefan; Kueter, Uwe (Germany). PCT Int. Appl. WO 2002013286 A2 20020214, 12 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (German). CODEN: PIXXD2. APPLICATION: WO 2001-DE2922 20010806. PRIORITY: DE 2000-10038538 20000808.
AB An electrochem. **cell**, esp. a **fuel cell** comprises a polymer electrolyte membrane, and at least 1 elec. conductive bipolar plate, or an elec. conductive **end plate**, which is produced by injection molding of plastics including non-metallic materials that increases the cond., and metal fibers 1-15 wt.% (preferably 7-8 wt.%). The metal fibers having an averaged length of 2-10 mm, and diam. of 6-20 μm are selected from stainless steel, Ti, or an alloy. A **thermoplastic**, preferably a polyamide is used as plastic, and C in form of soot, graphite, or carbon fibers is suitable as non-metallic material that increases the cond. The 2 gas diffusion electrodes are arranged on both sides of the membranes, and terminated by the bipolar plates.
IC ICM H01M
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **fuel cell** bipolar plate polyamide; bipolar plate injection molding plastic; metal fiber carbon plastic bipolar plate
IT **Fuel cell** separators
(bipolar plate; elec. conductive bipolar plates of **fuel cells** produced by injection molding of plastics)
IT Soot
(in elec. conductive bipolar plates of **fuel cells** produced by injection molding of plastics)
IT Carbon fibers, uses
Polyamides, uses
(in elec. conductive bipolar plates of **fuel**

cells produced by injection molding of plastics)

IT Molding of plastics and rubbers
(injection; **fuel cell** with elec. conductive bipolar plates produced by)

IT **Fuel cells**
(with elec. conductive bipolar plates produced by injection molding of plastics)

IT 7440-32-6, Titanium, uses 7782-42-5, Graphite, uses 12597-68-1, Stainless steel, uses
(in elec. conductive bipolar plates of **fuel cells** produced by injection molding of plastics)

L46 ANSWER 8 OF 9 HCA COPYRIGHT 2004 ACS on STN
130:354758 Low cost, lightweight **fuel cell** elements.
Kindler, Andrew (California Institute of Technology, USA). PCT Int. Appl. WO 9927601 A1 19990603, 33 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1998-US25081 19981123. PRIORITY: US 1997-66537 19971126.

AB New **fuel cell** elements for use in liq. feed **fuel cells** are provided. The elements including biplates and **endplates** are low in cost, light in wt., and allow high efficiency operation. Elec. conductive elements are also a part of the **fuel cell** elements. At least one substantially planar plate is fabricated from a polymeric material; the plate has ≥1 surface that presses against a membrane electrode assembly of the liq. **fuel cell**.

IC ICM H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST **fuel cell** element

IT Polymers, uses
(co-; low cost, lightweight **fuel cell** elements)

IT **Fuel cells**
(low cost, lightweight **fuel cell** elements)

IT Phenolic resins, uses
Polyamides, uses
Polycarbonates, uses
Polyesters, uses
Polyethers, uses
Polyolefins

(low cost, lightweight **fuel cell** elements)
IT Plastics, uses
(**thermoplastics**; low cost, lightweight **fuel cell** elements)
IT 7782-42-5, Graphite, uses 9002-88-4, Polyethylene 9003-53-6 24968-12-5, Polybutylene terephthalate 25038-59-9, Polyethylene terephthalate, uses
(low cost, lightweight **fuel cell** elements)

L46 ANSWER 9 OF 9 HCA COPYRIGHT 2004 ACS on STN
64:41412 Original Reference No. 64:7681b-d **Fuel cell** battery. (Allmanna Svenska Elektriska Aktiebolag). NL 6414147 19650621, 12 pp. (Unavailable). PRIORITY: SE 19631219.
AB The battery consists of 2 or more electrode elements, each with an active electrode mounted in a window, which is partly made of **thermoplastic** material, and provided with a cooling arrangement. The elements are piled up, one above the other. The windows in the elements are connected to one another and the gaps around them are filled with the **thermoplastic** material. Heating wires are laid around the windows for heating the plastic in situ and thus to form seals with it. Suitable **thermoplastic** materials are: polyethylene, polypropylene, fluorocarbon resins, chlorinated polyesters, poly(vinyl chloride), polyamide, etc. This set-up eliminates the heavy and bulky **end-plates** or flanges generally used to hold the elements together, and makes the assembling and mass production of batteries much easier.
IC H01M
CC 15 (Electrochemistry)
IT **Cells**, voltaic
(**fuel**, **thermoplastic** materials for)
IT Esters
(poly-, Cl-contg., as binders in **fuel cells**)
IT Amides
(poly-, **fuel cells** using, to bind components)
IT Fluorocarbons
(polymers, **fuel cells** using, to bind components)
IT 9002-88-4, Ethylene polymers
(**fuel cells** using, to bind battery components)
IT 9002-86-2, Ethylene, chloro-, homopolymer 9003-07-0, Propene polymers
(**fuel cells** using, to bind components)

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FILE LAST UPDATED: 14 MAY 2004 <20040514/UP>
MOST RECENT DERWENT UPDATE: 200431 <200431/DW>
DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE

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L47 ANSWER 1 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 2004-181614 [18] WPIX
DNN N2004-144354 DNC C2004-071962
TI Composite separator plate for use in **fuel cell** array, e.g. bipolar plate for proton exchange membrane **fuel cell** used as energy source e.g. in vehicle, contains expanded graphite or compressible conductive material dispersed in polymer.
DC A32 A85 L03 X16
IN ABD ELHAMID, M H; BLUNK, R H; LISI, D J; MIKHAIL, Y M
PA (GENK) GENERAL MOTORS CORP; (ELHA-I) ABD ELHAMID M H; (BLUN-I) BLUNK R H; (LISI-I) LISI D J; (MIKH-I) MIKHAIL Y M
CYC 3
PI DE 10330832 A1 20040205 (200418)* 20 H01M008-02
US 2004062974 A1 20040401 (200425) H01M008-02
JP 2004134373 A 20040430 (200430) 18 H01M008-02
ADT DE 10330832 A1 DE 2003-10330832 20030708; US 2004062974 A1 Provisional US 2002-394647P 20020709, US 2003-603684 20030626; JP 2004134373 A JP 2003-272199 20030709
PRAI US 2002-394647P 20020709; US 2003-603684 20030626
IC ICM H01M008-02
ICS B29C043-02; B29C070-58; C08K003-00; C08K003-04; C08L101-00; H01B001-24
AB DE 10330832 A UPAB: 20040316
NOVELTY - Composite separator plate for use in a **fuel cell** array, of the type with a first surface and a second surface turned away from the first, comprises expanded graphite (IA) dispersed in a polymer material (II).

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) composite separator plate of this type, comprising compressible conductive material (IB) dispersed in (II);

(2) production of the separator plate by preparing (IA) particles, dispersing them in (II) and press molding.

USE - The composite separator plate is used in **fuel cells** (claimed) and is e.g. a bipolar plate for proton exchange membrane (PEM) **fuel cells** used as energy source for many purposes, including vehicle applications.

ADVANTAGE - Existing composite separator plates with a high content of graphite powder in a polymer matrix withstand the

corrosive environment of **fuel cells** but are inherently brittle and dense. Plates containing aligned conductive fibers can be made thinner. Reducing the carbon content makes them less brittle but makes it very difficult to attain the required electrical and thermal conductivity. These drawbacks are avoided in the present plates. They have high electrical and thermal conductivity at low contents of conductive filler, can be molded to thin and less brittle plates and meet the mass and volume requirements for **fuel cells.**

DESCRIPTION OF DRAWING(S) - The drawing shows a schematic exploded view of a proton exchange membrane (PEM) **fuel cell.**

Fuel cell array with bipolar PEM and 2 cells 10

Membrane electrode arrays 12, 14

Electrically conductive, liquid-cooled, bipolar separator plate 16

Stainless steel clamping plates 18, 20

Current collector **end plates** 22, 24

Insulating seals 36, 38, 40, 42

Gas-permeable carbon/graphite diffusion media 44, 46, 48, 50

Dwg.1/12

TECH DE 10330832 A1 UPTX: 20040316

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Materials: The compressible conductive material (IB) is expanded graphite (IA). The particle size of (IA) is 0.4-3.0 mm and over 10% of the final plate thickness. (IA) is compressible and porous. Preferred filler materials include glass fibers, carbon fibers based on polyacrylonitrile and metal fibers and mesh.

TECHNOLOGY FOCUS - POLYMERS - Preferred Product: The separator plate contains about 10-50 (especially 20-35) vol.% (IA). At least some (IA) extends from the first surface of the plate to the second. The plate preferably also contains a filler material, dispersed in the polymer (II). The plate has a hydrogen permeation of under 0.01 mA/cm2 at 25 psig, 80degreesC and 0.5 mm. The first surface is coated with conductive material (preferably selected from gold, silver, platinum, carbon, palladium, rhodium and ruthenium) in contact with (IA). The plate has a surface resistivity less than 40 mOMEGA.cm2 at compression pressures at most 200 psi and over 25 psi and less than 20 mOMEGA.cm2 at compression pressures at least 200 psi. Preferred Materials: (II) is selected from thermosetting and **thermoplastic** polymers, preferably epoxide, polyvinyl ester, polyester, polypropylene and poly vinylidene fluoride. Preferred filler materials include cotton flock and polymer mesh. Preferred Production: (IA) is mixed or strewn in (II). The particles are prepared by grinding (IA) to the required particle sizes and/or sieving. Filler may also be dispersed in the polymer. Part of (II) may be removed from (part of) one surface of the plate, preferably

by grinding. A conductive compound layer is formed on (part of) the plate, preferably by vapor deposition.

FS CPI EPI
FA AB; GI
MC CPI: A12-E06B; L03-E04G
EPI: X16-C16
PLE UPA 20040316

L47 ANSWER 2 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 2004-106055 [11] WPIX
CR 2000-204541 [18]; 2000-375785 [32]; 2000-498914 [44]; 2001-281146 [29]
DNN N2004-084350 DNC C2004-042887
TI Proton exchange membrane **fuel cell** assembly, has stacked **fuel cells** comprising membrane electrode assembly, both sides of which is bonded to separator having gasket at peripheral edge, through bonding material.
DC A85 L03 X16
IN KRASIJ, M; RAJPOLT, M J
PA (UTCF-N) UTC FUEL CELLS LLC
CYC 1
PI US 6387557 B1 20020514 (200411)* 11 H01M008-10
ADT US 6387557 B1 Cont of US 1998-176355 19981021, Cont of US 1998-182959 19981030, CIP of US 1998-220472 19981223, US 2000-666736 20000920
FDT US 6387557 B1 Cont of US 6020083, CIP of US 6159628, Cont of US 6165634
PRAI US 2000-666736 20000920; US 1998-176355 19981021; US 1998-182959 19981030; US 1998-220472 19981223
IC ICM H01M008-10
AB US 6387557 B UPAB: 20040213
NOVELTY - A **fuel cell** assembly (10) comprises **fuel cells** stacked upon one another and bonded with a bonding material. Each cell has a separator plate, and a membrane electrode assembly (20). Each side of the electrode assembly is bonded and sealed with bonding material to the separator plates. A compliant gasket material is arranged on the peripheral edge of the separator **plate** at one **end** of the sub-stack assembly.

USE - As proton exchange membrane fuel assembly.

ADVANTAGE - The PEM **fuel cell** assembly has good sealing characteristics, and is inexpensive to manufacture and capable of mass production. The assembly has more effective and reliable sealing with less leakage. The PEM fuel assembly uses inert materials which are less likely to introduce the contaminants into proton exchange membrane. Low scrap rates are observed during production of the **fuel cell** assembly. The

fuel cell construction method produces a lower cost assembly with improved performance and the stacking process is simplified. High seating loads are avoided and stiff silicone-coated fiber glass is eliminated during **fuel cell** construction.

DESCRIPTION OF DRAWING(S) - The figure shows cross sectional view of the PEM **fuel cell** employing **thermoplastic** sealing and bonding layers.

Proton exchange membrane **fuel cell** assembly 10

Membrane electrode assembly 20

Anode substrate 32

Cathode substrate 34

Thermoplastic material 46

Proton exchange membrane 48

Foam tape 60

Dwg.2/4

TECH US 6387557 B1 UPTX: 20040213

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred **Fuel Cell**: Alternately the proton exchange membrane (PEM) **fuel cell** assembly comprise sub-stack assemblies (I,II), where the sub-stack (II) is stacked on sub-stack assembly (I), with the compliant gasket of assembly (I) residing between both the assemblies.

Preferred Arrangement: The PEM **fuel cell** assembly has a proton exchange membrane (48) provided on one side with cathode catalyst layer and other side with anode catalyst layer. An anode porous substrate (32) is arranged on the side of the anode catalyst layer which is not contacting the proton exchange membrane, and a cathode porous substrate (34) is arranged on the side of cathode catalyst layer which is not in contact with the proton exchange membrane. A separator plate having a central area and peripheral area is disposed between the membrane electrode assembly of the adjacent cells. Layers of **thermoplastic** material are used for bonding and sealing the anode side of separator plate and cathode side of the separator plate relative to the respective sides of anode and cathode substrates. A sealing layer of foam tape (60), preferably neoprene tape or silicone tape is provided for bonding and sealing anode substrate and anode side of the separator plate relative to one another. A layer of **thermoplastic** material (46) is provided for bonding and sealing the anode substrate and proton exchange membrane relative to one another. A sealing layer of foam tape, preferably silicone tape is provided for bonding and sealing cathode side of the bi-polar plate and the cathode substrate relative to one another.

TECHNOLOGY FOCUS - POLYMERS - Preferred Materials: The bonding material is a **thermoplastic** polymer, a thermoset polymer or an elastomer which is a silicone polymer. The anode and cathode

porous substrates are impregnated at the periphery with a **thermoplastic** polymer.
Preferred **Thermoplastic** Polymer: The **thermoplastic** polymer is polyolefin material, polyvinyl fluoride material or polyvinylidene fluoride material.
Preferred Thermosetting Polymer: The thermoset polymer is phenolic or epoxy polymer.
Preferred Gasket Material: The gasket material is neoprene rubber or silicone rubber.

FS CPI EPI
FA AB; GI
MC CPI: A12-E06B; L03-E04A2; L03-E04G
EPI: X16-C01C; X16-C16
PLE UPA 20040213

L47 ANSWER 3 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 2004-059447 [06] WPIX
DNN N2004-048086 DNC C2004-024427
TI Contact plate for use in electrochemical cell comprises injection molded basic body formed of plastic-graphite composite having **thermoplastic** plastic component.
DC A85 L03 X16
IN HAGENBACH, T; MUELLER, A; VON GANSKI, A; GANSKI, A V; MULLER, A
PA (SIGE) SGL CARBON AG; (GANS-I) GANSKI A V; (HAGE-I) HAGENBACH T; (MULL-I) MULLER A
CYC 33
PI US 2003194597 A1 20031016 (200406)* 23 H01M008-02
DE 10216306 A1 20031120 (200406) H01M008-02
EP 1367664 A2 20031203 (200406) GE H01M008-02
R: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR
JP 2004031330 A 20040129 (200410) 20 H01M008-02
ADT US 2003194597 A1 US 2003-413038 20030414; DE 10216306 A1 DE 2002-10216306 20020414; EP 1367664 A2 EP 2003-8343 20030410; JP 2004031330 A JP 2003-109022 20030414
PRAI DE 2002-10216306 20020414
IC ICM H01M008-02
ICS B29C045-28; B29C045-40
AB US2003194597 A UPAB: 20040123
NOVELTY - Contact plate in an electrochemical cell having electrodes comprises an injection molded basic body having a through plane conductivity of at least 20 S/cm, and formed of a plastic-graphite composite having a **thermoplastic** plastic component. The body has at least one plate surface, a media distribution structure recessed in the plate surface, and a contact structure with contact structure elements.
DETAILED DESCRIPTION - Contact plate (7) in an electrochemical

cell having electrodes (2, 3) comprises an injection molded basic body (7') having a through plane conductivity of at least 20 S/cm, and formed of a plastic-graphite composite having a **thermoplastic** plastic component and a mass percentage of at least 70%. The body has openings for supply paths and discharge paths of media reacting at the electrodes. It has at least one plate surface, a media distribution structure recessed in the plate surface defining flow paths for distribution of the medium reacting at adjacent electrodes, and a contact structure protruding from the media distribution structure with contact structure elements for providing electrical contact with an electrode adjacent the basic body. Connections between the media distribution structure on the plate surface and the supply path and discharge path for the media reacting at the adjacent electrodes. The flow paths in the media distribution structure have base surfaces, wall surfaces, and first transitions from the base surfaces to the wall surfaces. The contact structure elements (16) have surfaces in contact with the adjacent electrodes, defining second transitions from the wall surfaces of the flow paths to the surfaces of the contact structure elements. The transitions are all rounded.

INDEPENDENT CLAIMS are also included for:

(a) a process for producing a contact plate for an electrochemical cell, which comprises:

(1) providing the second rounded transitions of the contact structure elements with a rounding radius;

(2) constructing the contact structure elements with the second rounded transitions to be at least higher by the rounding radius than required for fitting in a cell stack; and

(3) reducing the contact structure elements by at least the rounding radius for avoiding a loss of the surfaces of the contact structure elements;

(b) an injection mold for producing a contact plate for an electrochemical cell, which comprises two mold halves defining a parting surface between the halves, and rectangular ejectors having reliefs engaging behind the basic body and protruding at a front surface of the basic body over the parting surface for the removal of the basic body from the mold;

(c) a contact plate assembly comprising two of the basic bodies;

(d) an **end plate** comprising a contact plate;

(e) a bipolar plate comprising the contact plate; and

(f) a cooling plate assembly in a stack of **fuel cells** of the polymer-electrolyte **fuel cell** type, which comprises contact plates.

USE - The contact plate is used as i.e. an **end plate**, a bipolar plate or a cooling plate assembly (claimed), in an electrochemical cell or a stack of **fuel**

cells.

ADVANTAGE - The contact plate fulfills all requirements arising from use in **fuel cells** with equivalent quality to a plate produced in a conventional process with a longer cycle time. It allows reliable filling of the injection mold without deterioration in the surface structure of the bipolar plate.

DESCRIPTION OF DRAWING(S) - The figure is an exploded perspective view of a section of a **fuel cell** stack.

Electrodes 2, 3

Basic body 7'

Contact plate 7

Contact structure elements 16

Dwg.1/9

TECH US 2003194597 A1UPTX: 20040123

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Dimensions: The flow path has a given width, and the first transitions each have a radius of rounding of one-tenth to half of the given width. Each of the second transitions has a radius of rounding of 0.1-0.5 mm.

Preferred Components: The contact plate further comprises another media distribution structure. The electrodes are anode and cathode. The media distribution structure on one of the plate surfaces serves for distribution of a medium reacting at the anode, and the media distribution structure on the other of the plate surfaces serves for distribution of a medium reacting at the cathode. The plate is a bipolar plate in a stack of electrochemical cells.

TECHNOLOGY FOCUS - POLYMERS - Preferred Material: The **thermoplastic** is polypropylene.

Preferred Composition: The mass% of graphite is at least 86%.

FS CPI EPI

FA AB; GI

MC CPI: A12-E06; L03-E04A2

EPI: X16-C01C; X16-C16; X16-E02; X16-K

PLE UPA 20040123

[1.1] 2004; R00964 G0044 G0033 G0022 D01 D02 D12 D10 D51 D53 D58 D83; H0317; H0000; S9999 S1434; P1150; P1343

[1.2] 2004; ND07; ND01; Q9999 Q7410 Q7330; Q9999 Q7396 Q7330; N9999 N6484-R N6440; J9999 J2948 J2915

[1.3] 2004; R01778 D00 D09 C- 4A; A999 A135

L47 ANSWER 4 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2004-008510 [01] WPIX

CR 2004-303743 [28]

DNN N2004-005977 DNC C2004-002161

TI Composite electrolyte for electrochemical **fuel cells** comprises inorganic cation exchange material,

silica-based binder and polymer-based binder.

DC L03 X16

IN KURANO, M R; TAFT, K M

PA (HOKU-N) HOKU SCI INC

CYC 98

PI US 6630265 B1 20031007 (200401)* 10 H01M008-10

WO 2004015801 A1 20040219 (200414) EN H01M008-08

RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SI SK SL SZ TR TZ UG ZM ZW

W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SC SD SE SG SK SL TJ TM TR TT TZ UA UG US UZ VC VN YU ZA ZW

JP 2004079505 A 20040311 (200419) 20 H01M008-02

ADT US 6630265 B1 US 2002-219083 20020813; WO 2004015801 A1 WO 2002-US39104 20021205; JP 2004079505 A JP 2003-26537 20030203

PRAI US 2002-219083 20020813

IC ICM H01M008-02; H01M008-08; H01M008-10

ICS C25B013-00; H01M008-14

AB US 6630265 B UPAB: 20040429

NOVELTY - A composite electrolyte comprises an inorganic cation exchange material, silica-based binder and polymer-based binder.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:

(a) an electrochemical **fuel cell** (10) comprising an anode (42), a cathode (44), fuel supply mechanism for supplying fuel toward the anode, an oxidant supply mechanism for supplying oxidant toward the cathode, and a composite electrolyte that is positioned between the anode and cathode; and

(b) a method of fabricating a composite electrolyte for use in an electrochemical **fuel cell** comprising applying a viscous liquid composition comprising of an inorganic cation exchange material, silica-based binder, polymer-based binder and solvent onto a surface of a substrate, spreading the viscous liquid composition to form a uniform thickness layer on the substrate and allowing the solvent to evaporate from the viscous liquid composition to yield the composite electrolyte.

USE - Used as membrane electrolytes for electrochemical **fuel cells** (claimed).

ADVANTAGE - The composite electrolyte is efficient, reliable, quiet, lightweight and environmentally friendly.

DESCRIPTION OF DRAWING(S) - The figure illustrates a disassembled **fuel cell**.

Fuel cell 10

Membrane electrode assembly 12

Endplate 14

Anode 42

Cathode 44
Dwg.1/5
TECH US 6630265 B1 UPTX: 20040102
TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Composition: The composite electrolyte comprises 10-99, preferably 75-85 wt.% inorganic cation exchange material, 0.5-40, preferably 2.5-7.5 wt.% silica-based binder and 1-90, preferably 15-40 wt.% polymer-based binder. The composite electrolyte comprises at least 97 wt.% inorganic cation exchange material, silica-based binder and polymer-based binder.
Preferred Component: The silica-based binder can be colloidal silica or tetraethylorthosilicate.
Preferred Material: The inorganic cation exchange material is clays, zeolites, hydrous oxides and/or inorganic salts. It can also be montmorillonite, kaolinite, vermiculite, smectite, hectorite, mica, bentonite, nontronite, beidellite, volkonskoite, saponite, magadite, kenyaite, zeolite, alumina and/or rutile.

TECHNOLOGY FOCUS - POLYMERS - Preferred Component: The polymer-based binder can be latex and/or **thermoplastic**.

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Property: The composite electrolyte has a proton with a conductivity of at least 0.05 S/cm.
FS CPI EPI
FA AB; GI
MC CPI: L03-E04A1
EPI: X16-C01A; X16-J01C

L47 ANSWER 5 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 2003-903502 [82] WPIX
DNN N2003-721388 DNC C2003-256962
TI Electrochemical cassette for **fuel cell** stack, comprises at least one membrane electrode assembly adapted for contact with at least two plates, each plate comprising flow fields, each of which comprises groove(s).
DC A85 L03 X16
IN ENAYETULLAH, M; FORMATO, R M; OSENAR, P; SABIN, P
PA (PROT-N) PROTONEX TECHNOLOGY CORP
CYC 102
PI WO 2003092096 A2 20031106 (200382)* EN 47 H01M000-00
RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SC SD SE SG SK SL TJ TM TN TR TT TZ

UA UG US UZ VC VN YU ZA ZM ZW
ADT WO 2003092096 A2 WO 2003-US12684 20030423
PRAI US 2002-374631P 20020423
IC ICM H01M000-00
AB WO2003092096 A UPAB: 20031223
NOVELTY - An electrochemical cassette comprises at least one membrane electrode assembly adapted for contact with at least two plates, each plate comprising flow field(s), each of which comprises groove(s). Each membrane electrode assembly and each plate comprise oxidant manifold opening(s) and fuel manifold opening(s). Each plate has sealant channel(s) which extends through at least a portion of its thickness.

DETAILED DESCRIPTION - An electrochemical cassette comprises at least one membrane electrode assembly adapted for contact with at least two plates, each plate comprising flow field(s), each of which comprises groove(s). The flow fields consist of oxidant flow field, fuel flow field, or coolant flow field. Each membrane electrode assembly and each plate comprise oxidant manifold opening(s) and fuel manifold opening(s) where each respective manifold opening extends through the thickness of the cassette. Each plate has sealant channel(s) which extends through at least a portion of its thickness. The membrane electrode assemblies and plates are assembled and encapsulated at its periphery by a sealant. The sealant contemporaneously seals the respective channels of the plates to selectively block those reactant manifold opening which are not intended to deliver material to a particular flow field.

An INDEPENDENT CLAIM is also included for a **fuel cell** stack comprising electrochemical cassette(s), and **end plate**(s) having opening(s) which align with the reactant manifold opening(s). The **end plate** is assembled on top and/or bottom of the stack of electrochemical cassette(s) such that the openings in the **end plate** align with the fuel manifold openings, the oxidant opening, and optionally the coolant manifold openings.

USE - The electrochemical cassette such as **fuel cell** cassette, is useful in a **fuel cell** stack (claimed), e.g. proton exchange membrane **fuel cell** stacks.

ADVANTAGE - The cassette minimizes or prevents exposure of membrane electrode assemblies to reactants, waste streams, or cooling fluids around the various manifolds, thus avoiding cross-cell potential problems or material incompatibility. The **fuel cell** stack can be formed at reduced injection pressures to simplify component design and which do not require that a large area of each layer to be sacrificed to accommodate a sealing process. It can also be fabricated with a minimum of labor, reducing their cost and allowing for process automation.

DESCRIPTION OF DRAWING(S) - The figure is a pictorial view of a

fuel cell.
Dwg.1/17
TECH WO 2003092096 A2UPTX: 20031223
TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Components: Each membrane electrode assembly and each plate further comprises coolant manifold opening. Each membrane electrode assembly is in contact with a fuel flow field and oxidant flow field. Each manifold opening has a cross section which is the same as the area defined by the channel surrounding the manifold opening and the periphery of the plate. Sealant channel(s) is interposed between each membrane electrode assembly an each plate or between adjacent plates. Each flow field comprises interconnected grooves extending through a portion of the plate through which material can flow. Each membrane electrode comprises ion conductive layer interposed between two gas diffusion layers which comprise a catalyst. Each membrane electrode assembly comprises a composite membrane electrode assembly having an ion conductive layer interposed between gas diffusion layers and gasket surrounding the periphery of the laminate. The sealant or resin may be introduced into the cassette through sealant holes or sealant channel opening at the periphery of the plates. It may also be introduced by pressure assisted resin transfer or by vacuum assisted resin transfer under a positive pressure of 0-50 psi or partial pressure of 750 torr - 1 mTorr.

TECHNOLOGY FOCUS - POLYMERS - Preferred Materials: The resin and **end plates** comprise thermoset or **thermoplastic** material. The **thermoplastic** material consists of **thermoplastic** olefin elastomers, **thermoplastic** polyurethane, plastomer, polypropylene, polyethylene, PTFE, fluorinated polypropylene or polystyrene. The thermoset material consists of epoxy resins, urethanes, silicones, fluorosilicones, or vinyl esters. The **end plate** (s) comprises filled polymer composite consisting of glass fiber reinforced **thermoplastic** or graphite reinforced **thermoplastic.**
Preferred Parameters: The resin has a viscosity of 10000-150000 (preferably 10000-55000) cP.
FS CPI EPI
FA AB; GI
MC CPI: A12-E06; A12-E06C; L03-E04A2
EPI: X16-C01C; X16-C15; X16-E06A; X16-K
PLE UPA 20031223

L47 ANSWER 6 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 2003-482065 [45] WPIX
DNN N2003-383413 DNC C2003-128801
TI **Fuel cell** cassette for electrochemical and ion

exchange applications, has assembled membrane electrode assembly, fuel flow field, and oxidant flow field, with resin and sealant in their peripheral edges and sealant manifold openings.

DC A32 A85 J01 L03 P42 X16

IN ENAYETULLAH, M; FORMATO, R M; OSENAR, P; SABIN, P

PA (ENAY-I) ENAYETULLAH M; (FORM-I) FORMATO R M; (OSEN-I) OSENAR P; (SABI-I) SABIN P; (PROT-N) PROTONEX TECHNOLOGY CORP

CYC 100

PI WO 2003036747 A1 20030501 (200345)* EN 49 H01M008-02
RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW
US 2003096153 A1 20030522 (200345) H01M008-02

ADT WO 2003036747 A1 WO 2002-US33789 20021022; US 2003096153 A1 Provisional US 2001-337851P 20011022, US 2002-278057 20021022

PRAI US 2001-337851P 20011022; US 2002-278057 20021022

IC ICM H01M008-02
ICS B05D005-12; H01M002-08; H01M008-10

AB WO2003036747 A UPAB: 20030716
NOVELTY - A **fuel cell** cassette comprises assembled membrane electrode assembly, fuel flow field, and oxidant flow field to align their reactant and sealant manifold openings. A resin is introduced into peripheral edges of the membrane electrode assembly, fuel flow field, and oxidant flow field to encapsulate the periphery of the cassette. A sealant is introduced the sealant manifold openings.

DETAILED DESCRIPTION - A fuel cassette comprises a membrane electrode assembly, a fuel (14, 15) flow field, and an oxidant (12, 13) flow field, each component having reactant manifold opening(s) and sealant manifold opening(s) extending through their thickness. The membrane electrode assembly, fuel flow field, and the oxidant flow field are assembled relative to each other so that the respective reactant manifold openings and at least a portion of sealant manifold openings are aligned. A resin is introduced in to the peripheral edges of the electrode assembly, fuel flow field, and oxidant flow field to encapsulate the periphery of the cassette, and a sealant is introduced in the sealant manifold openings to enclose those openings that are not intended to deliver material to a particular flow field.

INDEPENDENT CLAIMS are also included for:

(a) a **fuel cell** stack comprising the inventive **fuel cell** cassette(s), and **end plate**(s) having opening(s) which align the reactant manifold openings;

(b) a method of manufacturing the inventive cassette by sealing the periphery of the cassette and a portion of the cassette surrounding the sealant manifold by applying pressure differential to the cassette; and

(c) a method of manufacturing a stack comprising assembling the stack and applying a compression mechanism to seal the **end plates** and cassettes into the stack.

USE - For electrochemical applications including **fuel cell**, as well as ion exchange applications.

ADVANTAGE - The invention allows the formation of an internal porting within the encapsulation, does not need for the separate step of port sealing individual components prior to the assembly of the **fuel cell** cassette, and develops **fuel cell** stacks and cassettes with enhanced reliability and reduction in labor and costs.

DESCRIPTION OF DRAWING(S) - The figure shows a manifold opening and injection hole pattern.

Oxidant 12, 13

Fuel 14, 15

Dwg.1/10

TECH WO 2003036747 A1UPTX: 20030716

TECHNOLOGY FOCUS - ELECTRONICS - Preferred Component: The **fuel cell** cassette also includes a non-porous separator plate having manifold opening(s) and sealant manifold opening(s), and a coolant flow fluid with at least two manifold openings and sealant manifold opening. The resin is in contact with at least a portion of the sealant.

TECHNOLOGY FOCUS - POLYMERS - Preferred Material: At least one of the sealant and resin is a thermoset material or **thermoplastic** material, preferably silicone. At least one of the **end plates** is composed of a filled polymer composite that is a glass fiber reinforced **thermoplastic** or a graphite reinforced **thermoplastic.**

FS CPI EPI GMPI

FA AB; GI

MC CPI: A11-B05; A11-C01C; A12-E01; A12-R08; J01-C03; L03-E04

EPI: X16-C01; X16-C15

PLE UPA 20030716

[1.1] 018; H0317

[1.2] 018; H0328

[1.3] 018; ND01; K9416; Q9999 Q7410 Q7330

[1.4] 018; Q9999 Q9007

[2.1] 018; K9892; H0317

[2.2] 018; ND01; K9416; Q9999 Q7410 Q7330

[2.3] 018; G2891 D00 Si 4A; A999 A419; S9999 S1070-R

[2.4] 018; R01778 D00 D09 C- 4A; A999 A419

L47 ANSWER 7 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2003-459602 [44] WPIX
DNN N2003-365574 DNC C2003-122402
TI Polymer electrolyte **fuel cell**, for portable power source, electric vehicle and co generation system, includes pair of **end plates** made of electrically insulating resin-dominant material.
DC A85 L03 X16
IN HASE, N; HATOH, K; KOBAYASHI, S; KUSAKABE, H; OHARA, H; TAKEGUCHI, S; YAMAZAKI, T; SUGOU, M
PA (MATU) MATSUSHITA ELECTRIC IND CO LTD; (MATU) MATSUSHITA DENKI SANGYO KK; (HASE-I) HASE N; (HATO-I) HATOH K; (KOBA-I) KOBAYASHI S; (KUSA-I) KUSAKABE H; (OHAR-I) OHARA H; (SUGO-I) SUGOU M; (TAKE-I) TAKEGUCHI S; (YAMA-I) YAMAZAKI T
CYC 35
PI EP 1291951 A2 20030312 (200344)* EN 31 H01M008-24
R: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR
CA 2401915 A1 20030311 (200344) EN H01M008-24
CN 1405916 A 20030326 (200344) H01M008-10
JP 2003163026 A 20030606 (200346) 17 H01M008-24
KR 2003022723 A 20030317 (200350) H01M008-24
US 2003152819 A1 20030814 (200355) H01M008-10
ADT EP 1291951 A2 EP 2002-256260 20020910; CA 2401915 A1 CA 2002-2401915 20020906; CN 1405916 A CN 2002-131538 20020911; JP 2003163026 A JP 2002-264497 20020910; KR 2003022723 A KR 2002-54434 20020910; US 2003152819 A1 US 2002-238903 20020911
PRAI JP 2001-274606 20010911
IC ICM H01M008-10; H01M008-24
ICS H01M002-14; H01M008-00
AB EP 1291951 A UPAB: 20030710
NOVELTY - A polymer electrolyte **fuel cell** comprises a cell stack comprising electroconductive separator plates and electrolyte membrane-electrode assemblies, a pair of current collecting plates and a pair of **end plates** made of an electrically insulating resin-dominant material.

DETAILED DESCRIPTION - A polymer electrolyte **fuel cell** comprises:

(a) a cell stack comprising electroconductive separator plates and electrolyte membrane-electrode assemblies respectively sandwiched between neighboring separator plates, each of the electrolyte membrane-electrode assemblies comprises a pair of electrodes with a polymer electrolyte membrane sandwiched between the pair of electrodes;

(b) a pair of current collecting plates sandwiching the cell stack;

(c) a pair of **end plates** sandwiching the cell stack provided with the pair of current collecting plates;

(d) a tightening mechanism for tightening the pair of

end plates to apply a tightening pressure to the cell stack; and

(e) gas supply and exhaust mechanism for supplying, to the cell stack, and exhausting, from the cell stack, an oxidant gas and a fuel gas, the gas supply and exhaust mechanism comprising an oxidant gas inlet, an oxidant gas outlet, a fuel gas inlet and a fuel gas outlet, and comprising an oxidant gas flow channel for connecting the oxidant gas inlet and the oxidant gas outlet and a fuel gas flow channel for connecting the fuel gas inlet and the fuel gas outlet.

The pair of **end plates** is made from an electrically insulating resin-dominant material comprising resin as a main ingredient.

USE - The **fuel cell** is used for a portable power source, an electric vehicle and a co generation system.

ADVANTAGE - Reduced cost and weight, improved utilization of thermal energy and improved corrosion resistance.

DESCRIPTION OF DRAWING(S) - The figure shows a front view of the **fuel cell**.

Dwg.2/16

TECH EP 1291951 A2 UPTX: 20030710

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Component: The **end plates** comprise an injection molded body made of the resin-dominant material. The resin-dominant material of the **end plates** contains a reinforcing material. The **end plates** have a reinforcing member provided on its outer main surface. Preferred Parameter: The tightening pressure by the tightening mechanism is 1.5-5 kgf/cm2 per unit area.

TECHNOLOGY FOCUS - POLYMERS - Preferred Material: The resin-dominant material comprises **polyphenylene sulfide**, liquid crystal polymer or polysulfone.

FS CPI EPI

FA AB; GI

MC CPI: A12-E06; L03-E04A2

EPI: X16-C01C

PLE UPA 20030710

[1.1] 018; D19 D18 D31 D76 D50 D86; P1478 P1467 H0293 F00 D01 D18

[1.2] 018; P1490-R F61 D01

[1.3] 018; B9999 B4331 B4240; ND01; Q9999 Q7410 Q7330

[2.1] 018; P0000

[2.2] 018; ND01; Q9999 Q7410 Q7330

L47 ANSWER 8 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2003-391635 [37] WPIX

DNN N2003-312826 DNC C2003-103984

TI Fabrication of molded **fuel cell end**

plate, uses long fiber reinforced **thermoplastic** resin composite comprising **thermoplastic** resin, and strand glass fiber.

DC A85 L03 X16 X21 X22

IN AGIZY, A E; HANSON, R G; SHERIDAN, D M

PA (AGIZ-I) AGIZY A E; (HANS-I) HANSON R G; (SHER-I) SHERIDAN D M

CYC 1

PI US 2002182470 A1 20021205 (200337)* 7 H01M008-02

ADT US 2002182470 A1 US 2001-827904 20010406

PRAI US 2001-827904 20010406

IC ICM H01M008-02

AB US2002182470 A UPAB: 20030612

NOVELTY - A molded **fuel cell end plate** (10) is fabricated from a long fiber reinforced **thermoplastic** resin composite comprising a **thermoplastic** resin, and at least 30 wt.% long strand glass fiber at least 5 mm in length.

USE - For fabricating a molded **fuel cell end plate** for **fuel cell endplate** assembly (claimed) used for **fuel cell**, i.e. an electrochemical energy conversion device.

ADVANTAGE - The invention has a strength and dimensional stability of thin dimensions, can be easily produced, and is resistant to corrosion by fuel, oxidant gas and coolant. It eliminates metal supporting members and headers, and separate **compression plates**.

DESCRIPTION OF DRAWING(S) - The figure shows a schematic of a **fuel cell** stack.

End plate 10

Dwg.1/2

TECH US 2002182470 A1UPTX: 20030612

TECHNOLOGY FOCUS - POLYMERS - Preferred Property: The diameter of the glass fiber is 10-25, preferably 15-20mum. The glass fiber is 5-20 mm long. The composite has a calculated creep resistance of less than 2, preferably less than 1.6.

Preferred Composition: The composite contains 40-60, preferably at least 45-55 wt.% glass fiber.

Preferred Component: The **thermoplastic** resin component comprises a **thermoplastic** polymer from partially **aromatic polyamides**, **polyarylsulfones**, **polyaryletherketones**, polyaryletheretherketones, **polyaryletherimides**, **polyarylimides**, aromatic **thermotropic liquid crystal** polymers or preferably **polyarylene sulfide**. The glass fiber is incorporated in the composite by pultrusion techniques and is fabricated as a single injection molded part.

ABEX US 2002182470 A1UPTX: 20030612

EXAMPLE - A pultruded polyphenylene sulfide composite containing 50

wt.% long glass fiber and 50 wt.% polyphenylene sulfide having a melt viscosity of 500 poise was injection molded on molding machine with a pg screw ASTM test specimens for measuring flexural creep. It was dried for 1 hours at 130degreesC prior to molding. The flexural creep of the molded sample was 0.71 after 0.1 hour and 1.05 after 200 hours.

FS CPI EPI
FA AB; GI
MC CPI: A12-E06C; A12-S08B; L03-E04
EPI: X16-C; X21-B01; X22-F01
PLE UPA 20030612

L47 ANSWER 9 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 2003-184467 [18] WPIX
DNN N2003-145277 DNC C2003-048686
TI Bipolar separator or **end plate** for electrochemical and **fuel cells**, includes core layer of metal, intermediate layer of noble metal layer, and outer cladding layer of conductive polymeric material.
DC L03 X16
IN DAVIS, H J
PA (DAVI-I) DAVIS H J; (AVAN-N) AVANTCELL TECHNOLOGIES INC
CYC 100
PI WO 2003009408 A1 20030130 (200318)* EN 25 H01M008-02
RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG US UZ VN YU ZA ZM ZW
US 2003027028 A1 20030206 (200325) H01M008-02
ADT WO 2003009408 A1 WO 2002-CA1110 20020717; US 2003027028 A1 US 2001-906715 20010718
PRAI US 2001-906715 20010718
IC ICM H01M008-02
ICS H01M008-24
AB WO2003009408 A UPAB: 20030317
NOVELTY - A bipolar separator or **end plate** has a core layer of metal with high electrical and thermal conductivity, an intermediate layer on the core layer comprising a noble metal layer; and an outer cladding layer of conductive polymeric material that both bonds to the noble metal layer, and forms a stable, low resistance contact, and which affords corrosion protection to the core layer.
USE - For electrochemical and **fuel cells** (claimed).

ADVANTAGE - The invention provides a low cost coating that not only protects the aluminum from corrosion but also prevents the formation of a high resistance layer in the path of electrical conduction through the plate structure. The junctions between coatings of a bipolar plate can be made of low resistance and exhibit true Ohmic behavior.

DESCRIPTION OF DRAWING(S) - The figure is a fragmentary cross-section through the surface region of a bipolar separator plate of the invention.

Core layer 1
Plated metal layer 2
Noble metal layer 3
Outer cladding layer 4

Dwg.1/3

TECH WO 2003009408 A1UPTX: 20030317

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Material: The core layer (1) is made of aluminum, magnesium, copper, steel or titanium or their alloys. The intermediate layer further includes a layer of zincated or stannated layer between the core layer and the noble metal layer (3). The layer between the core layer and the noble metal layer is a zincated layer from zincated aluminum plus electro-deposited nickel, zincated aluminum plus electro-deposited lead, zincated aluminum plus co-electrodeposited lead-tin, or zincated aluminum plus electrodeposited nickel and tin. The intermediate layer further includes at least one plated metal layer (2) between the zincated layer and the noble metal layer. The plated metal layer comprises an electroplated or deposited layer of nickel, tin, lead, bismuth, or indium. The core layer is configured with ridges and channels and covered with the intermediate and outer cladding layer conforming to the ridges and channels in the core layer such that the required flow fields are defined on the surfaces of the bipolar plate. The core and cladding layers are conjointly pressed to form the ridges and channels, with ridges on one external surface opposite channels in an opposite external surface. Preferred Property: The noble metal is silver in a thickness of 0.1-40, preferably 0.1-10 microns. The intermediate layer has a thickness of 10-20 microns.

TECHNOLOGY FOCUS - POLYMERS - Preferred Material: The outer cladding layer (4) comprises a **thermo-plastic** polymer or resin having carbon, or its allotropes, in powder or particulate form as conductive filler. The polymer or resin may also comprise silver or silver coated particles, or other stable metal materials in powder or particulate form as conductive filler.

FS CPI EPI
FA AB; GI
MC CPI: L03-E01A; L03-E04G
EPI: X16-C16; X16-F02

L47 ANSWER 10 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 2002-667362 [71] WPIX
DNN N2002-528021 DNC C2002-187489
TI Conductive plastic moulding material, especially for bipolar **plates** and **end plates** for **fuel cells**, comprises **polyarylene sulfide** or liquid crystalline plastic containing carbon black and graphite and-or metal powder.
DC A26 A32 A85 L03 X12 X16
IN FRITZ, H; HOFMANN, A; KAISER, R
PA (TICN) TICONA GMBH
CYC 101
PI WO 2002072669 A1 20020919 (200271)* GE 46 C08G075-02
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AU AZ BA BB BG BR BY BZ CA CN CO CR CU CZ DM DZ EC EE GD GE HR HU ID IL IN IS JP KG KP KR KZ LC LK LR LS LT LV MA MD MG MK MN MX NO NZ OM PH PL RO RU SG SI SK TJ TM TN TT UA US UZ VN YU ZA
DE 10112394 A1 20021002 (200273) C08L081-04
EP 1381640 A1 20040121 (200410) GE C08G075-02
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI TR
ADT WO 2002072669 A1 WO 2002-EP936 20020130; DE 10112394 A1 DE 2001-10112394 20010313; EP 1381640 A1 EP 2002-712873 20020130, WO 2002-EP936 20020130
FDT EP 1381640 A1 Based on WO 2002072669
PRAI DE 2001-10112394 20010313
IC ICM C08G075-02; C08L081-04
ICS C08G063-06; C08G063-183; C08G063-19; C08J005-10; C08K003-04; C08K003-08; C08L079-08; C08L081-02; H01B001-20; H01B001-22; H01B001-24; H01M008-02
AB WO 200272669 A UPAB: 20021105
NOVELTY - Plastic moulding materials (I) based on **polyarylene sulfide** and/or liquid crystalline plastic contain carbon black with a specific surface of 500-1500 m2/g and a dibutyl phthalate number of 100-700 ml/100 g together with graphite with a specific surface of 1-35 m2/g and/or metal powder.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:

(a) a method for increasing the conductivity of plastic moulding materials as above by the incorporation of carbon black and graphite and/or metal powder as described;

(b) bipolar **plates, end plates** or parts of **end plates** containing (I) for use in **fuel cells;**

(c) methods for the production of these plates from (I) by compression moulding or by combining the compounding and processing into a single-stage process.

USE - For the production of moulded products, film and fibres, especially moulded bipolar **plates, end plates** or parts of **end plates** for **fuel cells** (claimed).

ADVANTAGE - The combination of carbon black with graphite and/or metal powder has a synergistic affect, enabling the production of conductive plastic moulding materials with (a) better electrical and thermal conductivity, better flow properties and better mechanical properties than those of conventional carbon black compounds and (b) lower density and higher strength than graphite compounds (with similar electrical and thermal conductivity).

Dwg.0/13

TECH WO 200272669 A1UPTX: 20021105

TECHNOLOGY FOCUS - POLYMERS - Preferred Materials: Moulding materials (I) with a filler content of not more than 85 (preferably not more than 80) wt%.

Preferred Production Methods: Compression moulding after pre-milling (I) to particles sizes of 1500-50 (preferably 800-15) microns, injection moulding with or without a compression unit, or extrusion-compression moulding.

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Fillers: Carbon black with a particle size (in the matrix) of 0.01-2 (preferably 0.05-0.15) microns; graphite with a slightly pronounced structure and an average particle size of 1-1100 (preferably 50-450) microns; metal powder with a bulk density (ISO 3923/1) of 1-4 g/ml and with 5% of the particles up to 45 microns in size.

ABEX WO 200272669 A1UPTX: 20021105

EXAMPLE - Moulding materials were obtained by compounding Vectra A 950 (RTM: liquid crystalline plastic) in a Ko-kneader with various amounts of Ketjenblack EC-600JD (RTM: carbon black; DBT number 480-510 m/100 g; 7% particles below 125 microns) and/or Thermocarb CF-300 (RTM: graphite). In materials containing 7.5 wt% carbon black and various amounts of graphite, specific resistance decreased from 11.77 to 0.19 ohm.cm as the total filler content increased from 14.89 to 75.46 wt%, while the density increased from 1.39 to 1.99 g/ml. In materials containing carbon black only, resistance decreased from 68.45 to 1.12 ohm.cm as the filler content increased from 4.76 to 13.04 wt%, while the density decreased from 1.33 to 1.21 g/ml. In materials containing graphite only, resistance decreased from 999.72 to 0.36 ohm.cm as the filler content increased from 33.33 to 75 wt%, while the density increased from 1.68 to 2.03 g/ml.

FS CPI EPI

FA AB

MC CPI: A05-J05A; A07-A05; A08-M09A; A08-R03; A09-A02A; A09-A03; A11-B11; A12-E06; L03-E04
EPI: X12-D01X; X16-C16; X16-F03A
PLE UPA 20021105

L47 ANSWER 11 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 2002-295671 [34] WPIX
DNN N2002-230956 DNC C2002-086741
TI **End plate** for **fuel cell**, comprises a resin material having preset compressive strength.
DC A85 L03 X16
PA (TORA) TORAY IND INC
CYC 1
PI JP 2001236982 A 20010831 (200234)* 4 H01M008-24
ADT JP 2001236982 A JP 2000-48574 20000225
PRAI JP 2000-48574 20000225
IC ICM H01M008-24
AB JP2001236982 A UPAB: 20020528
NOVELTY - An **end plate** (A) consists of a resin material having compressive strength of 100 MPa or more.
DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for **fuel cell** using **end plate**.
USE - For **fuel cell**.
ADVANTAGE - The light weight **fuel cell** is manufactured easily using the **end plate**. The resin **end plate** is formed easily, hence the production of **end plate** is increased.
DESCRIPTION OF DRAWING(S) - The figure shows the respective diagram of **fuel cell** using resin **end plate**.
End plate A
Dwg.1/2
TECH JP 2001236982 AUPTX: 20020528
TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Resin Material: The resin material is a **thermoplastic** resin containing a reinforcement filler which is a glass fiber.
FS CPI EPI
FA AB; GI
MC CPI: A12-E06; L03-E04
EPI: X16-C
PLE UPA 20021113
[1.1] 018; H0317; P0000; K9892
[1.2] 018; ND01; Q9999 Q7410 Q7330; B9999 B4126 B4091 B3838 B3747; B9999 B4831-R B4740; K9892
[1.3] 018; G2891 D00 Si 4A; A999 A419

L47 ANSWER 12 OF 13 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
AN 1990-264362 [35] WPIX
DNC C1990-114282
TI Carbon plate prodn. - by dispersing carbon fibre in **thermoplastic** resin soln., impregnating into sheet etc..
DC A14 A21 A81 E36 L02
PA (SHOW) SHOWA DENKO KK
CYC 1
PI JP 02184510 A 19900719 (199035)* 6
JP 2780987 B2 19980730 (199835) 6 C04B035-83
ADT JP 02184510 A JP 1989-1926 19890110; JP 2780987 B2 JP 1989-1926 19890110
FDT JP 2780987 B2 Previous Publ. JP 02184510
PRAI JP 1989-1926 19890110
IC C01B031-02; C04B035-52
ICM C04B035-83
ICS C01B031-02; C04B035-52; C25B013-04; H01M004-88; H01M008-02
AB JP 02184510 A UPAB: 19930928
Carbon fibre of the length up to 0.5 mm is dispersed in **thermoplastic** resin soln. The dispersion liq. is impregnated in the sheet of carbon fibre or its precursor fibre. The resin is hardened and burned to produce carbon plate.

The **thermoplastic** resin is phenol resin, modified acrylic resin, furan resin, etc.

USE/ADVANTAGE - The carbon plate is used for a porous or minute carbon electrode of a phosphoric acid type **fuel cell**, a separator, a diaphragm of electrolysis tub, etc. The carbon plate has high electric conductivity and thermal conductivity in vertical direction to the face. The carbon **plate** has improved **compression** strength.

0/0
FS CPI
FA AB; DCN
MC CPI: A08-R03A; A10-E05B; A11-B09C; A12-E01; A12-S08C; A12-W12G; E31-N03; L02-H04A; L02-J02B; L03-A02B
DRN 1669-P; 1669-S
PLC UPA 19930924
KS: 0229 0486 0487 1277 1310 1990 1996 2020 2198 2200 2336 2422 2427 2434 2493 2506 2551 2631 2653 2723 2739 3277

FG: *001* 014 03- 034 074 081 14& 140 153 23& 231 236 359 392 398 431 432 440 473 477 506 509 551 56& 567 569 575 595 60- 623 627 688
CMC UPB 19930924
M3 *01* C106 C810 M411 M720 M903 M904 M910 N104 N515 Q130 Q453 Q454 Q606
DCN: R01669-P

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AN 1968-10852Q [00] WPIX
TI Stacked **thermoplastic** frames melt welded for.
DC A85 L03 X16
PA (ALLM) ALLMANNA SVENSKA ELEKTRISKA A/B
CYC 2
PI CA 789656 A (196800)*
DE 1471754 B 19740404 (197415)
PRAI SE 1963-14189 19631219
IC H01M027-02
AB CA 789656 A UPAB: 19930831
Thermoplastic resins (I) used in **fuel cell** construction (a) to form the frames surrounding each electrode and (b) as a compatible or identical melt material to provide the mechanical bridges connecting adjacent frames in a stack and defining channels for fuel, oxidants, coolant, etc. to pass through the elements in the stacked direction. Melting the material in situ for (b) may be achieved by induction heating of appropriate metal inserts, by use of a thermic torch, etc. (I) may be polyethylene, polypropylene, fluorocarbon, chlorinated polyethers, PVC, polyamide. Glass fibre or metal reinforcements may be used.

Much lighter and more compact construction possible, reducing the number of components considerably (i.e. elimination of packing gaskets or 'O' rings), and more amenable to mass production and modular battery construction. The individual elements are subjected to lower mechanical stresses than when clamped between **end plates** bolted together hard enough to seal channels through adjacent plates.

FS CPI EPI
FA AB
MC CPI: A11-C01; A12-E
PLC UPA 19930924
FG: *001* 01- 041 046 047 050 061 062 063 064 141 147 308 309 36&
441 454 60- 609 623 627 688 720 722 723